CHAPTER SEVEN

THE POPULATION VARIABLE: COMMUNITY ACTIONS AND ATTITUDES

Regardless of how well disaster health care is planned, accurately targeted to the population's actual needs, and carried out, the final health outcome of the disaster-affected population will depend heavily on the community itself. Community perceptions regarding the danger involved in the disaster event, as well as their ability to minimize that danger, affect the protective actions taken by the population. The protective actions may include measures employed before the impact of the disaster agent in order to minimize damage done to human beings. They may also include measures taken after the disaster onset to minimize the effects of the newly changed environment. This chapter is an examination of the population's actions and attitudes in the three study communities Juan Barón, Sabana Grande de Palenque, and Yaguate. The data come from both the 1979 and 1981 surveys. This chapter is not intended to be a presentation of scientifically generalizable information, but rather an indication of what happened in these three communities with a view to understanding how the population's reactions affect their eventual health outcome. The chapter is divided into the following sections: 1) protective action; 2) reactions; 3) disease prevention; 4) use of food and water; 5) reconstruction; 6) perceptions of well-being; and 7) conclusions.

Protective Actions

With the three communities combined, almost two-thirds (66.3%) of the population heard about the approaching hurricanes through radio or television (roughly equally split). Another 19% heard about the hurricanes through neighbors or friends, and one-seventh (14.5%) responded that they were not in any way notified about the approaching hurricanes. None of the respondents listed having received notification of the hurricanes directly through the Civil Defense, security officials, community leaders, or people from outside of the community. Newspapers are generally not avialable in these communities. As in many developing countries, radio plays an important role in everyday communications in the Dominican Republic, while television is rapidly increasing in importance. (One television may serve many families.) The Civil Defense's use of police and military personnel to notify people of the approaching potential disaster was reserved mostly for riverside residents in the area of the national capital, and not for the rural areas. Without having explicit proof, I expect that the majority of those who did not hear about the approaching hurricanes in the study communites were pricisely the most marginal sector of the population that was most vulnerable to flood damage.

Once people were advised of the approach of Hurricane David, they sought refuge according to what was available in the community and according to their understanding of what type of damage could be done by a hurricane. It should be noted here that the last large hurricane to pass through the Dominican Republic had done so in September of 1930.

The great majority of the population at the time of the 1979 hurricanes therefore had no personal experience with this powerful natural phenomenon. Table 7-1 shows the response to the question: "Where were you during Hurricane David?"

Table 7-1

Where Were You During Hurricane David? (1979)

	Community							
	Juan Baron		Palenque		Yaguate		Totals	
	#	%	#	%	#	%	#	%
Unspecified Shelter	1	1.7	0	0	0	0	1	0.4
Church	7	11.7	11	15.7	36	40.0	54	24.5
School	11	18.3	2	2.9	3	3.3	16	7.3
Clinic	8	13.3	8	11.4	11	12.2	27	12.3
Town Hall	23	38.8	32	45.7	8	8.9	63	28.6
In My Home	0	0	8	11.4	19	21.1	27	12.3
Home of Neighbors	7	11.7	3	4.3	0	0	10	4.5
Home of Relatives	3	5.0	5	7.1	3	3.3	11	5.0
Other Community	0	0	0	0	2	2.2	2	0.9
No Answer	0	0	1	1.4	8	8.9	9	4.1
Use of Official Shelter	83.3%		76.8%		70.7%		76.3%	

Combining the three communities, an average of 76.3% of the population sought refuge in a shelter that had been officially designated as such. The community of Juan Barón had the least official shelter room available, but because it also had the strongest lack of

other shelter possibilities due to extremely poor housing, this community had the highest attendence in official shelters (83.3%). Yaguate had the highest number of privately owned concrete block buildings as well as the highest index of people who opted to shelter themselves in their own homes. It is suspected that the ten respondents in Juan Barón who reported having spent the hurricanes in the home of a neighbor or relative were all actually in the home of Tomás Valera, the one privately owned concrete block home in the pre-hurricane community. Valera estimated that over 500 people spent the storms in his home, with standing room only for most of the duration of the storms. The Valera house at least had one bathroom for 500 people, while larger shelters were not as well equipped. The church in Yaguate, which may have housed over 2,000 people, had no toilets or latrines.

Many people apparently did not think of seeking shelter as a necessary security precaution until the storm had already arrived. When asked what security precautions they took to protect themselves and their families before the hurricane struck, only an aggregate of 61.2% of the population of the three communities listed shelter seeking as their first precaution (Table 7-2). When both first and second precautions are added together and averaged, only 35.1% of the precautions involved seeking shelter, while 47.1% of the population said they did nothing precautionary. Only an aggregated 3.0% thought of or attempted to store food, water, candles, or fuel. More than twice as many, 6.5% sought to limit damage to their homes by securing the doors and windows, while 4.8% gathered their belongings. It is clear that the

Table 7-2
What Security Precautions Did You Take to Protect Yourself and Your Family Before the Cyclone?
(Number/Percentage)

COMMUNITY	Nothing	Seek Shelter in a House	Gather the Family	Close & Protect Doors &	Gather Belong-ings	Store Food, Water, Can-dles, Fuel	Go to a Formal Shelter	Send Family to a Shelter	Other
Juan Baron									
1st Precaution	5/8.3	15/25.0	2/3.3	4/6.7	3/5.0	0/0	31/51.6	0/0	0/0
2nd Precaution	48/82.7	3/5.2	0/0	1/1.7	3/5.2	0/0	3/5.2	0/0	0/0
Palenque									
1st Precaution	9/12.1	16/22.9	4/5.7	4/5.7	1/1.4	2/2.9	34/48.6	0/0	0/0
2nd Precaution	59/84.2	4/5.7	0/0	0/0	1/1.4	3/4.3	3/4.3	0/0	0/0
Yaguate									
1st Precaution	20/22.5	20/22.5	6/6.7	15/16.9	6/6.7	4/4.4	18/20.2	0/0	0/0
2nd Precaution	63/73.3	4/4.7	2/2.3	4/4.7	7/8.1	4/4.7	1/1.2	0/0	1/1.2
Totals									
1st Precaution Only	34/15.5	51/23.3	12/5.5	23/10.5	10/4.6	6/2.7	83/37.9	0/0	0/0
Both Precautions	204/47.1	62/14.3	14/3.2	28/6.5	21/4.8	13/3.0	90/20.8	0/0	1/0.2

population of these communities had only a very poor idea of the damage a hurricane can cause, and of what the post-hurricane needs would be. Two of the three communities were almost totally destroyed by the storms.

As a measure of experiential learning, in the 1981 survey the community members were asked, "What precautions would you take next time?" The results (Table 7-3) were not exactly what might have been hypothesized in accordance with the sociological work which shows that the best motivator for disaster preparedness is to have a disaster. Only a cumulative 2.5% said that they would store food, water, candles and fuel, although the importance of these commodities and the post-disaster scarcity of them was obvious to all who experienced the hurricanes. The percentage of the population in Palenque and Yaguate who chose as their first precaution to seek formal shelter almost doubled, but decreased in Juan Barón. The reason for the decrease in Juan Baron is that the community has nearly completely rebuilt with concrete block homes, each family having at least part of their home constructed as a hurricane shelter. Almost 52% of the Juan Barón interviewees said they would seek shelter in their own homes. Significantly, within all three communities and with both first and second precautions aggregated, the percentage of respondents who said they would do nothing remained virtually unchanged — from 47.1% in 1979 to 47.6% in 1981.

Not only did many community members do little to prepare for the hurricane, they also apparently talked little about what to do (Table 7-4). Over half either had nothing to say concerning what to do about the approaching storm, or simply noted that it was said to be a very

Table 7-3
What Precautions Would You Take Next Time? (1981)
(Number/Percentage)

COMMUNITY	Nothing	Seek Shelter in a House	Gather the Family	Close & Protect Doors &	Gather Belong-ings	Store Food, Water, Can-dles, Fuel	Go to a Formal Shelter	Send Family to a Shelter	Other
Juan Baron									
1st Precaution	1/1.9	28/51.9	0/0	2/3.7	0/0	1/1.9	20/37.0	0/0	2/3.7
2nd Precaution	50/92.6	1/1.9	2/3.7	1.1.9	0/0	0/0	0/0	0/0	0/0
Palenque									
1st Precaution	0/0	4/8.3	2/4.2	1/2.1	0/0	0/0	41/85.4	0/0	0/0
2nd Precaution	42/87.5	0/0	1/2.1	1/2.1	0/0	1/2.1	3/6.3	0/0	0/0
Yaguate									
1st Precaution	11/14.3	6/7.8	2/2.6	5/6.5	9/11.7	3/3.9	32/41.6	4/5.2	5/6.5
2nd Precaution	67/87.0	0/0	0/0	1.1.3	0/0	4/5.2	3/3.9	2/2.6	0/0
Totals									
1st Precaution Only	12/6.7	38/21.1	5/2.8	8/4.4	9/5.0	4/2.2	93/51.7	4/2.2	7/3.9
Both Precautions	171/47.6	39/10.9	8/2.2	11/3.1	9/2.5	9/2.5	99/27.6	6/1.7	7/1.9

Table 7-4
Did You Speak With Someone About the Hurricane, and What to Do? (1979)
(Number/Percentage)

COMMUNITY	No Nothing	Go To a Shelter, or Building with a Concrete Roof	Secure the Doors & Windows	It was Very Powerful, Dangerous, Worse than 1930	Close the House on Side Facing Winds, Open Opposite side	False Information, David Would Not Arrive, but Pass By	Protect Oneself From Electricity & Blowing Corregated Roofing	For Nobody to go out on the Streets	To Buy Food and Fuel
Juan Baron	14/25.9	24/44.4	1/1.9	11/20.4	1/1.9	2/3.7	0/0	1/1.9	0/0
Palenque	29/42.6	21/30.9	2/2.9	14/20.6	0/0	1/1.5	0/0	1/1.5	0/0
Yaguate	27/31.0	38/43.7	3/3.4	13/14.9	1/1.1	3/3.4	1/1.1	0/0	1/1.1
Totals	70/33.5	83/39.7	6/2.9	38/18.2	2/1.0	6/2.9	1/0.5	2/1.0	1/0.5

powerful one. Over a third spoke of seeking shelter in a secure place, but other security-related conversation received very little attention. Only one of the 209 respondents in the three communities reported discussion about conserving food and fuel.

In regard to what few suggestions were made, more that a quarter of the respondents could not remember who made them (Table 7-5). Most of them were apparently made within primary or secondary social relationships. The only official organization that was well-remembered for having warnings about what to do in preparation for the storm was Civil Defense, via the popular media, with an aggregated 19.1% positive response in the surveyed population.

Once the hurricane had passed, there were few actions that the survivors took in group form to help themselves (Table 7-6). Over 35%

Table 7-5
Do You Remember Who Made These Suggestions? (1979)
(Number/Percentage)

	Juan Baron	Palenque	Yaguate	Totals
No	6/15.0	24/46.2	12/18.5	42/26.8
Myself or Family Member	7/17.5	5/ 9.6	13/20.0	25/15.9
Police, Armed Forces, Firemen	2/ 5.0	0/ 0	1/ 1.5	3/ 1.9
Neighbors	7/17.5	5/ 9.6	17/26.6	29/18.5
Radio and Television	2/ 5.0	2/ 3.8	1/ 1.5	5/ 3.2
Civil Defense	7/17.5	11/21.2	12/18.5	30/19.1
Community Leaders	4/10.0	4/ 7.7	7/10.8	15/ 9.5
Doctor(s)	4/10.0	1/ 1.9	0/ 0	5/ 3.2
Priest(s)	1/ 2.5	0/ 0	2/ 3.1	3/ 1.9

Table 7-6
What Actions Did You Take As a Group? (1979)

	Juan Baron	Palenque	Yaguate	Totals
Nothing	18/36.7	19/33.3	32/36.4	69/35.6
Tried to Provide First Aid	15/30.6	23/40.4	37/42.0	75/38.6
Clear the Streets	2/ 4.1	0/ 0	2/ 2.3	4/ 2.1
Repair Bridges, Streets	0/ 0	0/ 0	0/ 0	0/ 0
Obtain, Divide and Cook Food	0/ 0	0/ 0	0/ 0	0/ 0
Divide Shelter, Salvage Debris	0/ 0	0/ 0	2/ 2.3	2/ 1.0
Clean Shelters	0/ 0	1/ 1.8	2/ 2.3	3/ 1.5
Look for Shelter	1/ 2.0	4/ 7.0	4/ 4.5	9/ 4.6
Construct Emergency Housing	13/26.5	10/17.5	9/10.2	32/16.4

said they did nothing as a group, 22% worked together in some fashion on constructing temporary shelter, and over 38% said they tried to provide first aid. Food storage was almost totally destroyed in all three communities, yet no one reported having collaborated to obtain or prepare food. Only 3.6% reported having worked together on general clean-up efforts. While the number of people who worked collectively to provide first aid is relatively high, it is clear that most of the immediate response to the disaster-imposed changes was individualistic in these three isolated rural communities. I had expected a higher degree of collaboration, especially after several disaster relief providers had reported to me that the rural populations were highly collaborative in comparison to the urban groups.

Immediate Reactions to the Hurricanes

Perhaps one of the reasons that so few took reasonable precautions before the onset of Hurricane David is that the population had very little idea of what the storm would bring. About 70% of the population surveyed (Table 7-7) thought the storm would be weaker than

Table 7-7
How Had You Imagined The Hurricane Was Going to Be? (1979)
(Number/Percentage)

	Juan Baron	Palenque	Yaguate	Totals
Worse Than it Was	9/15.5	3/ 4.3	3/ 3.3	15/ 6.9
Less Powerful Than it Was	33/56.9	53/75.7	66/73.3	152/69.7
About as it Was	9/15.5	4/ 5.7	3/ 3.3	16/ 7.3
I Did Not Imagine It	7/12.1	10/14.3	18/20.0	35/16.1

it actually was, and an additional 16% could not even imagine what the storm would be like. Only about 7% imagined the storm would be worse than it turned out to be.

During the storm, the surveyed population felt a great variety of physical and psychological symptoms (Table 7-8). Thirty percent of the combined populations in the three communities reported having thought they would die, and a large percentage felt "heart palpitations" (probably simple tachycardia), "tight throat," cold sweat, crying, stomach ache, and trembling knees. More significant from a health viewpoint, is that 12% reported having diarrhea and 10% reported

Table 7-8
What Symptoms Did You Experience During the Hurricane? (1979)
(yes or no; percentages given are for "yes")

Symptoms	Juan Baron	Palenque	Yaguate	Totals
Cold Sweat	24.0	46.2	27.9	66/201 = 32.8%
"Tight" throat	20.7	32.9	25.8	58/217 = 26.7%
Heart Palpitations	40.7	42.9	50.0	99/219 = 45.2%
Neck Pain	24.1	28.6	22.2	54/218 = 24.8%
Teeth Gritting	22.8	18.8	15.7	40/215 = 18.6%
Crying	29.3	24.3	33.3	64/218 = 29.4%
Stomach ache	21.4	31.4	28.9	60/216 = 27.8%
Diarrhea	12.3	11.4	13.3	27/217 = 12.4%
Uncontrolled Urination	7.3	10.0	12.2	22/215 = 10.2%
Uncontrolled Defecation	4.0	2.9	2.2	6/209 = 2.9%
Trembling knees	33.3	31.4	43.3	79/214 = 36.9%
Nervous Stamping	8.0	5.8	5.6	13/209 = 6.2%
Thought I Would Die	29.3	25.7	34.4	66/218 = 30.3%
Vomiting	5.5	2.9	4.4	9/215 = 4.2%

having uncontrolled urination. With the extreme levels of crowding in the shelters and the lack of sanitary facilities, it is clear that diarrhea and uncontrollable urination as psychological responses to the storm also acted to increase the opportunity for group exposure to excreta-carried infectious diseases. It is also interesting that there is little variation among the communties in the experiences reported.

Disease Prevention Concepts

In order for a population to make preparations for the prevention of disaster-induced health problems, it needs to have some idea of what problems are likely to occur post-disaster. The three communities studied in this research had fairly good impressions of what

diseases would actually occur, as measured by their responses in the two-week survey (Table 7-9). The diseases listed as most likely were colds, high fever, diarrhea, measles, gastro-enteritis, malaria, typhoid fever, and vomiting. While the exact order of diseases may not be what occurred in each community, the population's basic understanding was correct. Moreover, it is clear that this popular understanding of post-disaster disease potential was not based on high literacy or health training. The above diseases are constantly present or potential in the environment of the communities, and the population recognized that a sudden severe ecological change could increase the incidence of the diseases.

The next step is for the population to know how to prevent disease increases from occuring after a disaster. As seen in Table 7-10, less than a third of the population thought of good hygiene and water boiling as a method of post-disaster disease prevention. Over 43% thought of vaccinations as the prime disease preventative. In an uneducated population it is not surprising to see a general belief in the magic of vaccinations. It is surprising, however, that so few people put emphasis on good hygiene. The survey was done two weeks after the hurricanes, and in those two weeks radio programs were filled with government-sponsored warnings about the need for good hygiene and water purification. (Battery powered transistor radios survived the hurricanes in abundance and were the primary source of information for most rural communities.) It is also surprising that so few people (only 1.8%) recognized the importance of eating well, particularly since malnutrition and its sequelae are common problems in the Dominican

Table 7-9
What Diseases Do You Think Could Come As A Result of the Hurricanes? (1979)
(Number/Percentage)

Disease	Juan Baron 60 Resp.	Palenque 69 Resp.	Yaguate 88 Resp.	Totals 217 Resp.
Colds & Influenza	21/35.0	28/40.6	51/60.0	100/46.1
High Fever	31/51.7	34/49.3	31/35.2	96/44.2
Diarrhea Only	39/65.0	29/42.0	16/18.1	84/38.7
Measles	20/33.3	40/58.0	7/ 7.9	67/30.9
Gastroenteritis	16/26.7	6/ 8.7	43/48.9	65/30.0
Malaria	17/28.3	19/27.5	29/32.9	65/30.0
Typhoid Fever	8/13.3	21/30.4	34/38.6	63/29.0
Vomiting Only	15/25.0	11/15.9	7/ 7.9	33/15.2
Tetanus	5/ 8.3	6/ 8.7	10/11.4	21/ 9.7
Do Not Know	5/ 8.3	5/ 7.2	10/11.4	20/ 9.2
Headache	1/ 1.7	6/ 8.7	5/ 5.7	12/ 5.5
Bronchitis	1/ 1.7	4/ 5.8	6/ 6.8	11/ 5.1
Skin Diseases	1/ 1.7	0/ 0	8/ 9.1	9/ 4.1
Tuberculosis	4/ 6.7	2/ 2.9	3/ 3.4	9/ 4.1
Cholera	2/ 3.3	6/ 8.7	0/ 0	8/ 3.7
Epidemics	2/ 3.3	3/ 4.3	2/ 2.3	7/ 3.2
Pneumonia	1/ 1.7	1/ 1.4	4/ 4.5	6/ 2.8
Chicken Pox	0/ 0	1/ 1.4	4/ 4.5	5/ 2.3
Syphilis	3/ 5.0	0/ 0	0/ 0	3/ 1.4
Hepatitis	0/ 0	1/ 1.4	2/ 2.3	3/ 1.4
Polio	0/ 0	2/ 2.9	1/ 1.1	3/ 1.4
Rheumatism	0/ 0	1/ 1.4	2/ 2.3	3/ 1.4
Malnutrition	0/ 0	1/ 1.4	2/ 2.3	3/ 1.4
Whooping Cough	0/ 0	0/ 0	3/ 3.4	3/ 1.4
Stomach Ache	0/ 0	1/ 1.4	2/ 2.3	3/ 1.4
Skin Fungus	1/ 1.7	0/ 0	1/ 1.1	2/ 0.9
Parasites	0/ 0	1/ 1.4	1/ 1.1	2/ 0.9
Allergies	0/ 0	0/ 0	2/ 2.3	2/ 0.9
Typhus	0/ 0	1/ 1.4	0/ 0	1/ 0.5
Pelvic Pain	0/ 0	0/ 0	1/ 1.1	1/ 0.5
High Blood Pressure	0/ 0	0/ 0	1/ 1.1	1/ 0.5
Sore Throat	0/ 0	1/ 1.4	0/ 0	1/ 0.5
"Mosquito Disease"	0/ 0	1/ 1.4	0/ 0	1/ 0.5

Table 7-10
What Could Be Done Now To Prevent These Diseases From Occurring? 1979)
(Number/Percentage)

COMMUNITY	Nothing	Vaccinate	Go to A Doctor	Injections	Give Medicines	Go to the Curandero	Cleanliness, Hygiene, Boil Water	Eat Well	Other
Juan Baron									
1st Precaution	0/ 0	24/40.0	13/21.7	4/6.7	9/15.0	0/ 0	8/13.3	1/ 1.7	1/ 1.7
2nd Precaution	43/71.7	3/ 5.0	3/ 5.0	2/3.3	3/ 5.0	0/ 0	6/10.0	0/ 0	0/ 0
Palenque									
1st Precaution	1/ 1.4	29/42.0	8/11.6	1/1.4	1/ 1.4	0/ 0	22/31.9	1/ 1.4	6/ 8.7
2nd Precaution	44/63.8	5/ 7.2	2/ 2.9	1/1.4	5/ 7.2	0/ 0	9/13.0	3/ 4.3	0/ 0
Yaguate									
1st Precaution	0/ 0	42/46.7	9/10.0	0/ 0	0/ 0	0/ 0	32/35.6	2/ 2.2	5/ 5.6
2nd Precaution	59/65.6	3/ 3.3	4/ 4.4	0/ 0	1/ 1.1	0/ 0	21/23.3	1/ 1.1	1/ 1.1
Totals									
1st Precaution Only	1/0.4	95/43.4	30/13.7	5/2.2	10/4.6	0/ 0	62/28.3	4/1.8	12/5.5
Both Precautions	147/33.6	106/24.2	39/8.9	8/1.8	19/4.3	0/ 0	98/22.4	8/1.8	13/3.0

Republic. We can only guess at the reasons for this population's inability to suggest effective disease preventative actions, but a chief reason is probably the total lack of health education. It is clear that this would attenuate the communties' ability to take care of themselves in the post-disaster period.

Following up the previous question, we asked the communities how human excreta should be disposed of (Table 7-11). Over 81% knew to use latrines or toilets, and only a very few (2.8%) gave the wrong answers (from a health standpoint) of throwing excreta in the river or countryside. It is unknown exactly how these populations acted upon the above demonstrated knowledge of proper excreta disposal, but oral reports indicate that nearly all latrines were knocked out by the hurricanes and the few remaining were so quickly overwhelmed that they were not used. Only after several months passed were sufficient latrines built to fulfill the needs of the communities.

Water and Food Use

A little more is known about how the communities handled water and food requirements in the first two post-disaster weeks (Tables 7-12 to 7-14). The communities differed significantly from each other in where they procured water, according to geography and normal water sources. In Juan Barón, which is close to a major river, 65% of the sample obtained water from the river, which would probably be the most polluted of local sources. Palenque, which is the furthest from its

Table 7-11
How Do You Think Human Excreta Should be Disposed Of? (1979)
(Number/Percentage)

Method	Juan Baron	Palenque	Yaguate	Totals
Nothing	0/ 0	0/ 0	0/ 0	0/ 0
Deposit it far from tne house	2/3.3	4/6.0	2/2.2	8/3.7
Use Latrines	39/65.0	41/61.2	76/84.4	156/71.9
Bury it in a hole	9/15.0	14/20.9	3/3.3	26/12.0
Use a good toilet	10/16.7	3/4.5	8/8.9	21/9.7
Use sanitation trucks	0/ 0	0/ 0	0/ 0	0/ 0
Throw it in the river	0/ 0	3/4.5	0/ 0	3/1.4
Throw it in the countryside	0/ 0	2/3.0	1/1.1	3/1.4
Do not know	0/ 0	0/ 0	0/ 0	0/ 0

Table 7-12
From Where Are You Obtaining Drinking Water? (1979)
(Number/Percentage)

Source	Juan Baron	Palenque	Yaguate	Totals
River	39/65.0	0/ 0	0/ 0	39/17.7
Well	15/25.0	21/30.0	2/2.2	38/17.3
Rainwater	6/10.0	10/14.3	64/71.1	80/36.4
From a neighbor	0/ 0	1/1.4	0/ 0	1/0.5
From a delivery truck	0/ 0	12/17.1	17/18.9	29/13.2
From a public tap	0/ 0	0/ 0	0/ 0	0/ 0
Several of the above	0/ 0	0/ 0	0/ 0	0/ 0
From personal water storage	0/ 0	26/37.6	7/7.8	33/15.0

Table 7-13
Do You Do Anything To The Water Before Drinking It? (1979)
(Number/Percentage)

Method	Juan Baron	Palenque	Yaguate	Totals
No, nothing	10/19.2	22/37.3	38/52.1	70/38.0
Boil it	28/53.8	26/44.1	23/31.5	77/41.8
Put lemon in it	14/26.9	11/18.6	12/16.4	37/20.1

Table 7-14
(For Those Who Became Ill After the Hurricanes)
What Was Your Source of Food? (1981)

Source	Juan Baron	Palenque	Yaguate	Totals
Own Food	9/23.1	31/32.3	12/35.3	52/30.8
Colmado (local store)	10/25.6	13/13.5	22/64.7	45/26.6
Donated foods cooked by an organization	5/12.8	9/9.4	0/ 0	14/8.3
Foods donated crude	15/38.5	43/44.8	0/ 0	58/34.3

normal water source, seemed best prepared for the hurricane; 37% obtained their water from private storage. In Yaguate, 71% of the sample used the potentially cleanest source of water -- rainwater. However, it is not known how the rainwater was collected or how its collection might have contaminated it. It is interesting, however, that the community which used the most heavily contaminated source of water,

Juan Barón, also had the highest percentage of people boil their water (53.8%, Table 7-13). It is possible that the other communities' lower compliance with the directive to boil water may have been the result of a perception of decreased exposure to harmful pathogens, due to their "safer" sources of water. Nevertheless, with the three communities combined, a majority (58.1%) either did nothing to their water before consuming it, or put lemon in it. In much of Central America and the Caribbean the lemon is popularly believed to have almost magical curative powers, possibly a result of the discovery of its ability to cure scurvy several centuries ago. An effective chemical means of water treatment, such as the use of iodine, was unavailable. With only 41% of the populace boiling its water in the ecological turmoil of the immediate post-hurricane period, it is no surprise that water-borne diseases would experience increased transmission. Part of the reason for the low compliance may have been that fuel sources for water boiling were also destroyed by the hurricanes, but this would not explain the variation in community responses. The variation seems more highly correlated with the perception of danger. More research needs to be done on how remote communities could be more highly motivated to provide their own sanitation protection after disasters.

The survey unfortunately only asked about the food habits of those who became ill after the hurricanes, the results of which appear in Table 7-14. Yaguate, which is more urbanized than the other two communities and adjacent to the main east-west highway from Santo Domingo, was the only community which was close to being self-sufficient in food following the hurricanes. In the other two communities, where a

majority of the food consumed was donated by outside sources, only 8.3% of those who became ill received food which had been cooked by the donating organization. Pre-cooked donated food is thus an unlikely cause of much disease transmission. If food was a major disease carrier, it must have been prepared by individuals or small groups. No contamination studies were done on the food that was donated, crude or otherwise, or on food which was included in emergency shipments to the small local stores called "colmados." Therefore, it is impossible to say what role food or food preparation had in disease transmission after the hurricanes.

RECONSTRUCTION

The three communities responded quite differently from each other in the way they faced the tasks of reconstruction. The community of Yaguate suffered much less destruction than the other two communities, having had "only" two-thirds of its housing totally or partially destroyed (Table 7-15). Juan Barón reported over 96% of its housing totally or partially destroyed, and Palenque 100%. (In reality, each of the two communities had only three buildings left in useable condition after the storms, accounting for a better than 99% loss.) These two communities suffered comparatively more by having more vulnerable housing in the first place, and because Yaguate lies some eleven kilometers further inland than do the coastal communities of Juan Barón and Palenque. As seen in Tables 7-16 A and 7-16 B, a "composite home" in Palenque and Juan Barón prior to the hurricanes had thatch or wood walls, a corregated iron roof, and concrete floors. These homes

Table 7-15
Condition of Homes Immediately After Hurricane David
(figures in percentages)

Condition	Juan Baron	Palenque	Yaguate
Totally Destroyed	86.8	91.5	41.7
Partially Destroyed	9.4	8.5	26.2
Minor Damage	3.8	0	21.4
No Damage	0	0	10.7

were no match for the winds of Hurricane David, and often the only thing left following the storm were the concrete floors. Before the Hurricanes, Yaguate had a much higher percentage of homes with concrete or cinder block walls (45.9%), and close to a quarter of the homes had poured concrete roofs. The experience in this part of the Dominican Republic was that a building had to have a concrete roof on top of concrete or cinder block walls in order to weather the storms without serious damage. Buldings with concrete walls, but a more vulnerable roof, lost the roofs to the winds, and the walls then often collapsed, because they lacked the horizontal reinforcement normally afforded by the roof supports.

Yaguate's response to its loss of housing was to construct "ranchitos" or temporary shacks. Then most people, with a little outside help, rebuilt their homes as they had existed before the storms.

Table 7-16 A
Home Building Materials Prior to the Hurricanes and Two Years Afterwards
(Figures in Percentages)

	Juan Baron						Palenque						Yaguate					
	Before			After			Before			After			Before			After		
Material	Roof	Walls	Floor	Roof*	Walls	Floor	Roof	Walls	Floor	Roof	Walls	Floor	Roof	Walls	Floor	Roof	Walls	Floor
Concrete		9.4	87.0	30.0	3.7	78.0		6.1	89.1		2.0	65.2	24.7	34.1	87.1	10.8	14.6	65.9
Brick		3.7						2.0			2.0							
Palm Thatch		35.2			18.5			8.2			10.2			10.6				
Reed-Palm-Mud Thatch		1.9						6.1										
Concrete Block		9.3			55.6			8.2			2.0			11.8			19.5	
Wood		40.7			18.5			69.4			59.2			43.5			32.9	
Corregated Iron	76.1			60.0	1.9		84.8			89.1	6.1		70.6			65.1		
Reed Thatch	2.2			2.0			4.3				8.2		2.4			1.9		
Stone Mosaic			2.2									2.2			7.1			4.9
Earth			10.9			20.0			10.9			19.6			5.9			4.9
Cane	19.6			4.0			8.7						2.4					
Others	2.2			2.0			2.2											1.2
Did Not Reconstruct				2.0	1.9	2.0				10.9	10.2	13.0				22.9	23.2	23.2

*The roofs of most new homes in Juan Baron consisted of concrete over the hurricane shelter portion of the home, and corregated iron over the rest.

Table 7-16 B
Composites of Home Building Materials
Prior to Hurricanes and Two Years Afterwards

Juan Baron Before:
Home with palm thatch or wooden walls, corregated roof with concrete floor.

Juan Baron After:
Many homes with concrete or cinder block walls, concrete or corregated roof and concrete floors. Great decrease in the number of homes made of vulnerable materials.

Palenque Before:
Home with wood or thatch walls, corregated roof and concrete floor.

Palenque After:
Home with wood or thatch walls, corregated roof and concrete floor. Vulnerability unchanged or worse.

Yaguate Before:
Home with wood or concrete walls, corregated or concrete roof and concrete floor.

Yaguate After:
Less reconstruction than in the other two communities. New homes had walls of concrete or wood, corregated or concrete roofs and concrete floors. Increased percentage of overall housing with concrete walls/ roof combination means decreased vulnerability.

Wood and corregated iron building materials were made available by CARE and the Dominican Housing Ministry (INVI), but the donations were insufficient to cover all the needs. Some families with more money, between 10% and 15% of those who rebuilt, improved their homes' hurricane resistance by using the stronger concrete walls and roofs. A community reconstruction committee was formed, but has had little apparent effect on the overall reconstruction effort.

Palenque also had an individualist response to the nearly total

destruction of housing. Again, "rancnitos" were constructed, and two years later many families were still living in their slightly improved shacks. If anything, in Palenque, housing became more vulnerable to hurricane damage. This was not just because of poor building materials used, but also because the homes were built in a haphazard manner. Several attempts to form an active reconstruction committee or cooperative failed in the face of conflict between long-standing competitive power blocks in the community. CARE and INVI organized a project to rebuild the community's lost housing, using a cinder block and concrete roof design. However, at the two-year mark fewer than five homes had been built (out of 500 needed), and there were reportedly deeded to several of Palenque's wealthier families. The rest of the building funds were reported to have disappeared. Some building materials were stockpiled in town, but without the active participation of the community, all progress had halted. The general atmosphere was one of pessimism, fear of vulnerability in the event of another storm, and a general desire to have someone from the capital intervene and find solutions for Palenque's myriad problems.

Juan Baron is an example of what can (and should) be done in community reconstruction following a major natural disaster. As in the other communities, "ranchitos" were erected soon afer Hurricane David. However, the day after the hurricane, all of the community's leaders and many of its inhabitants gathered together to form a reconstruction committee and to plan for an all-community cooperative cleanup and reconstruction effort. They held daily meetings to discuss problems, progress, and their response to the onset of Hurricane Frederick.

Within ten days of the committee's formation, the previously mentioned group of Mennonites from the U.S. entered Juan Barón and asked if they might be able to help in the reconstruction effort. The town's leadership eagerly agreed, and the town was rebuilt with all hurricane-proof housing, as described previously in Chapter 6. The end result of the reconstruction work was a town with a completely different physical aspect, a more differentiated economy, and considerably better protection from any future hurricanes.

CONCEPT OF WELL-BEING

In both the two-week and the two-year surveys the respondents were asked to estimate their state of well-being. In the two-week survey they were asked to estimate their well-being prior to the storms, their well-being at that point two weeks after the storms, and what they expected it to be in the future. In the two-year survey they were asked to estimate their relative well-being at that point of time two years after the hurricanes. The results are presented in Table 7-17. Consistent with other sociological studies, in the 1979 survey the population, although experiencing a precipitous drop in relative well-being in the immediate post-disaster period, predicted a future state of well-being that would be superior to the pre-disaster period. The community with the most optimism about the future, Yaguate, is the most urban of the three communities and has the highest standard of living. It also rated itself lowest in the pre-disaster period, perhaps because of a stronger sense of relative deprivation induced by exposure to

Table 7-17
Well-Being Scale
(Figures in Percentages)

Community & Time Period	Lowest 1	2	3	4	5	6	7	8	9	Highest 5
Juan Baron										
Before Storms	13.3	10.0	10.0	10.0	25.0	5.0	8.3	8.3	10.0	56.6
Immed. Afterward	79.7	6.7	6.7	1.7	3.3	0	0	0	1.7	5.0
In Future (1979)	10.0	1.7	5.0	8.3	20.0	5.0	11.7	11.7	26.7	75.1
At Present (1981)	18.5	14.8	9.3	16.7	14.8	5.6	14.8	3.7	1.9	40.8
Palenque										
Before Storms	1.4	5.7	10.0	4.3	18.6	8.6	10.0	18.6	22.9	78.7
Immed. Afterward	72.9	4.3	5.7	4.3	1.4	2.9	5.7	0	2.9	12.9
In Future (1979)	4.3	1.4	2.9	4.3	2.9	0	5.7	17.1	61.4	87.1
At Present (1981)	38.8	20.4	14.3	12.2	8.2	2.0	0	0	4.1	14.3
Yaguate										
Before Storms	10.0	6.7	15.6	14.4	15.6	13.3	6.7	10.0	7.8	53.4
Immed. Afterward	51.1	20.0	7.8	10.0	5.6	3.3	0	2.2	0	11.1
In Future (1979)	3.3	0	2.2	2.2	10.0	4.4	16.7	10.0	51.1	92.2
At Present (1981)	8.3	9.5	10.7	20.2	14.3	10.7	3.6	9.5	13.3	51.4

wealthier urban lifestyles.

The more significant observation provided by the data is related to the "at present" question in the two-year survey. In the two communities where reconstruction resulted in an actual improvement in the community over the pre-disaster period, Juan Barón and Yaguate, the positive (mid-point or above) ratings for "at present" jumped from 35 to 40 points between the 1979 and 1981 surveys. In Palenque, where conditions were worse than during the pre-hurricane period, the positive rating rose only 1.4 points, remaining below 15% of the sample. While these samples are too small to "test" for statistical significance, it is clear that the relative success of the reconstruction effort has something to do with the variance in the populations' perceived well-being. Palenque not only shows pessimism in the survey statistics, but repeated conversations with its inhabitants pointed toward the lack of a successful reconstruction effort as one of their chief complaints about life in September, 1981. Relief and reconstruction can make a difference in the well-being of disaster-affected populations.

CONCLUSIONS

These communities were probably not very helpful in terms of protecting their own health in the immediate pre- and post-disaster periods. Most people knew little of what a hurricane is or the damage it is capable of doing, and they did little to protect themselves from the negative effects of the storms. Only three percent said they took the important actions of storing food, water, or fuel. And apparently, their experiential learning was poor; in the 1981 survey the same 47%

said they would take no precautions should another storm occur. Additional research needs to investigate whether this low motivation is common in poor rural "third world" communities, and what the reasons for it might be. Many middle class urban Dominicans suggest that the rural poor are complacent to simply sit and wait for outside help to arrive, due to long-standing dependency relationships started during the years of terror under the Trujillo regime. I suspect, however, that this is more likely an example of the fatalism described by authors such as Paulo Freire,[1] as a basic characteristic of the culture of poverty.

In terms of disease prevention, the surveyed populations had a good idea of what diseases would most likely occur following the hurricanes. In all cases they chose diseases that are endemic to the area. The respondents did not, however, know how to prevent post-hurricane disease increases. They held a common belief in the magic of vaccinations and lemon juice, and neither recognized nor gave credence to the importance of good hygiene or nutrition. The problem of (perhaps) misplaced faith in vaccinations is double-edged; if an effort is made to decrease the belief in the cure-all capability of vaccinations, the result may be lower compliance with regular vaccination programs. The belief in the cure-all properties of the lemon is centuries old and very difficult to break; in spite of ample empirical evidence that lemon juice does not cure what ails them or their children, people continue to believe in it. Perhaps health promoters will in the future be able to help dispel this belief. It is

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[1] See: Freire, Paulo: Pedagogy of the Oppressed, New York: Continuum Publishing Company, 1970.

disheartening that so few people complied with the national campaign to boil water before its consumption. More investigation is needed into the reasons for this phenomenon. Perhaps the fact that the community with the highest compliance also had the riskiest water supply indicates the need for individuals to recognize their vulnerablity before they will take protective action.

Particularly in Juan Barón and Palenque, poor housing increased the vulnerability of community members to physical harm from the forces of the hurricanes. Although Yaguate perhaps improved its "hurricane-proof" housing by as much as 10%, the real reconstruction lessons are to be learned from the examples of Palenque and Juan Barón. Palenque's failure to reconstruct, even to the pre-disaster level, can be attributed to myriad problems, the chief among them being the community's inability to overcome old disputes and inequalities in order to work together on community improvement. In the face of political rancor and indecision within the community, the "top-down" aid offered by CARE and INVI has been essentially useless. In fact, this non-productive aid has probably served to focus even more the population's discontent with life in Palenque since the hurricanes.

Juan Barón, on the other hand, provides examples of how a community can learn from its experiences and work to decrease its vulnerability in the future. It also provides an example of how outside relief and reconstruction help can work from the "bottom-up" to provide the community with lasting improvements. The community decided that having three shelters in town was not enough, so it designed homes that

provided every family with its own emergency shelter. This not only decreases vulnerability to physical injury in the event of another hurricane, but, as we have seen, the increased population dispersion also decreases the chance of mass disease transmission caused by crowding in shelters. The Mennonites' approach in asking how they might help and then providing some guidance, rather than simply providing goods and services and then leaving, gives us a good example of how disaster relief and reconstruction can be used to further a community's long-term well-being and economic development. This approach is time- and labor- intensive and may not be easily adopted by large relief organizations, but its clear benefits demand that it be given serious consideration. It is questionable whether the Mennonite approach would have been successful in strife-ridden Palenque, a mere three kilometers from Juan Barón.

This chapter raises more questions than it answers. I spent considerable time trying to find out why the communities of Juan Barón and Palenque responded so differently to virtually identical circumstances. The answer people consistently gave me was that the two communities had always, within the memory of present inhabitants, reacted differently to the problems of life. For example, the inhabitants of Juan Barón have traditionally harvested their crops in a communal fashion, whereas Palenque's farmers do not share responsibilities. The Mennonites, in fact, originally intended to work in Palenque, but moved on to Juan Barón after it became clear that Palenque lacked sufficient community cohesion to initiate an organized response to post-disaster problems. Although I am not a trained

anthropological observer, I could not find any obvious differences in the two communities in terms of kinship patterns, gender roles, family division of labor, religious beliefs, etc. The differences between the two communities' disaster responses are clear, but the reasons for them remain unexplained.

Other mysteries abound, for example, the reasons for the lack of experiential learning, or the lack of cooperation in water purification. We are still far from understanding how communities might be organized or encouraged to protect their own health in emergency situations (or, by extension, in everyday life). It is hoped that this chapter will provide some insight into the way three rural Dominican communities faced the demands of the hurricane experience and how their reactions and actions potentially affected their disaster health outcome. This population variable is an important component of the overall health outcome of disaster-affected populations and needs further study if we are to decrease population vulnerability to uncontrollable natural events.